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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/590,462	06/09/2000	Marco Racanelli	050324-1220	1783

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EXAMINER

DIAZ, JOSE R

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 12/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/590,462

Applicant(s)

RACANELLI ET AL.

Examiner

José R Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-9,17-22,26-29 and 31-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-9,17-22,26-29 and 31-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 03 September 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 14.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

➤ The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on September 3, 2002 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

➤ The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

➤ Claims 1-2, 4-9, 17-22, 26-29, and 31-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Takemura (US Pat. No. 5,627,402).

Regarding claims 1, 9, 26 and 35, Takemura teaches a method of forming a varactor device (see Figs 3-8) comprising: providing a semiconductor substrate (11, 12) having a first conductivity type (P or N+, respectively); providing an isolation structure (15) defining an implant region (consider the region comprised of 13, 14 and 17) (see Fig. 3); selecting a first peak dopant concentration (14) and a first implant energy to optimize at least one of capacitance, leakage current, a tuning range of the varactor device (see Figs. 4(A)- 4(B) and 7(A)-7(B)); forming a first implant (14) in said implant region having said first peak dopant concentration and a second conductivity type (N), extending into the implant region to a first distance (see Fig. 3); forming a second

implant (13₁) in said implant region having a second peak dopant concentration (N-) and said second conductivity type, extending into a second distance; and wherein said second distance is greater than first distance (see Fig. 3).

Regarding claims 2 and 29, Takemura further teaches the step of annealing the device (see Fig. 4(A)).

Regarding claims 4-5 and 31-32, Takemura further teaches determining an as-implanted dopant concentration profile for said first implant (14) (see Figs. 4(A) and 7(A)).

Regarding claims 6 and 33, Takemura further teaches selecting said second peak dopant concentration and said second implant energy such that the base resistance of the varactor is minimized (see Figs. 4(A)- 4(B) and 7(A)-7(B)).

Regarding claims 7-8 and 34, Takemura further teaches determining an as-implanted dopant concentration profile for said second implant (13₁) (see Figs. 4(A) and 7(A)).

Regarding claims 17, 20, 27 and 36, Takemura further teaches forming a contact layer (16) of said first conductivity type (P) overlying said first implant (14) (see Fig. 3).

Regarding claim 18, 21, 28 and 37, Takemura further teaches that said first and said second conductivity types are the same (N-type) (see regions 12, 13₁, 14 in Fig. 3).

Regarding claims 19 and 22, Takemura teach that said step of providing an isolation structure comprises providing an isolation structure including a CMOS well (13₂) (see Fig. 3).

➤ Claims 1-2, 4-9, 17-22, 26-29, and 31-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Huisman et al. (US Pat. No. 5,854,117).

Regarding claims 1, 9, 26 and 35, Huisman et al. teach a method of forming a varactor device (see Figs 1-6) comprising: providing a semiconductor substrate (1) having a first conductivity type (N); providing an isolation structure (2, 4) defining an implant region (consider opening 5) (see Fig. 1); selecting a first peak dopant concentration (3) and a first implant energy to optimize at least one of capacitance, leakage current, a tuning range of the varactor device (see Tables 2 and 3 and Fig. 6); forming a first implant (3, 8) in said implant region having said first peak dopant concentration and a second conductivity type (N), extending into the implant region to a first distance (see Fig. 5); forming a second implant (7) in said implant region having a second peak dopant concentration (N) and said second conductivity type, extending into a second distance; and wherein said second distance is greater than first distance (see Fig. 5).

Regarding claims 2 and 29, Huisman et al. further teach the step of annealing the device (see Tables 2 and 3)

Regarding claims 4-5 and 31-32, Huisman et al. further teach determining an as-implanted dopant concentration profile for said first implant (3) (see Tables 2 and 3).

Regarding claims 6 and 33, Huisman et al. further teach selecting said second peak dopant concentration (7) and said second implant energy such that the base resistance of the varactor is minimized (see Tables 2 and 3 and Fig. 6).

Regarding claims 7-8 and 34, Huisman et al. further teach determining an as-implanted dopant concentration profile for said second implant (7) (see Tables 2 and 3).

Regarding claims 17, 20, 27 and 36, Huisman et al. further teach forming a contact layer (9) of said first conductivity type overlying said first implant.(3) (see Fig. 4).

Regarding claim 18, 21, 28 and 37, Huisman et al. further teach that said first and said second conductivity types are the same (N-type) (see regions 1, 2, 3, 7 in Fig. 5).

Regarding claims 19 and 22, Huisman et al. teach that said step of providing an isolation structure comprises providing an isolation structure including a CMOS well (2) (see Fig. 5).

Response to Arguments

➤ Applicant's arguments with respect to claims 1-2, 4-9, 17-22, 26-29, and 31-37 have been considered but are moot in view of the new ground(s) of rejection.


Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 746-3891 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
December 2, 2002



EDDIE LEE
SUPERVISOR, EXAMINER
TECHNICAL CENTER